ILLINOIS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

PRODUCTION NOTE

University of Illinois at
Urbana-Champaign Library
Large-scale Digitization Project, 2007.

Population status of the Illinois chorus frog (*Pseudacris streckeri illinoensis*) in Madison County, Illinois: Results of 1995 surveys

IDOT CONTRACT 1-5-90179

FINAL REPORT ON 1995 RESULTS

John K. Tucker

Center for Aquatic Ecology

Illinois Natural History Survey

4134 Alby Street

Alton, Illinois 62002

and

David P. Philipp

Center for Aquatic Ecology

Illinois Natural History Survey

607 E. Peabody

Champaign, Illinois 61781

December 1995

J. K. Tucker

Co-Principal Investigator

Center for Aquatic Ecology

Illinois Natural History Survey

Dr. David P. Philipp

Co-Principal Investigator

Center for Aquatic Ecology

Illinois Natural History Survey

DISCLAIMER

The findings, conclusions, and views expressed herein are those of the researchers and should not be considered as the official position of the Illinois Department of Transportation.

ACKNOWLEDGMENT OF SUPPORT

This research (contract number 1-5-90179) was funded by the Illinois Department of Transportation.

EXECUTIVE SUMMARY

A study of the biology of the Illinois chorus frog, *Pseudacris streckeri illinoensis*, is reported. Surveys of Madison County for choruses of the frogs located seven choruses. We found frogs at seven choruses in 1995. These choruses were located at the same sites that choruses werer found in 1994. No frogs were found at historical sites near Granite City, South Roxana, or New Poag Road similar to results in 1994. We used drift fences near historical chorus sites to look for frogs living in the sites but moving to other si[illegible] to breed. We caught no frogs on an extensive series of drift fences more tha[illegible] 1.2 km in length. The absence of choruses at historical sites and lack of captures of frogs moving to current choruses strongly supports the hypothesis that frogs have been extirpated from much of the Poag sand terrace. We agian estimated population size using recaptures of frogs marked in 1993. Our estimate of 344 frogs is close to a previously reported estimate of 420 frogs in 1994. We estimate adult survivorship as 28.3% for frogs between one a[illegible] two years of age.

tes

n

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGMENTS

We thank S. R. Ballard, J. B. Camerer, J. B. Hatcher, G. B. Rose, an M. Tucker for field assistance. L. E. Brown provided many useful suggestions concerning the biology of the frog and helped with literature needs. G. B. Rose pointed out locations of historical records for choruses. G. E. Kruse provided permits necessary for this project. K. Brockmeier, Brockmeier Sod Farms, allowed unrestricted access to his property and permitted drift fences to be placed in his wheat field. The staff at Home Greenhouses allowed us access to their facilities.

M.

INTRODUCTION

The Illinois chorus frog, *Pseudacris streckeri illinoensis*, is restricted to areas of sandy substrates found in the floodplains of the Mississippi and Illinois rivers in Arkansas, Illinois, and Missouri (Conant and Collins, 1991). Because these habitats have been converted to agriculture or developed for other human activities, *P. s. illinoensis* is now uncommon. It is listed as a threatened species in Illinois (Herkert, 1992), as a rare species in Missouri (Anonymous, 1992), as a species of special concern in Arkansas (R. Roberg, pers. comm.), and as federal C-2 species (Dodd et al., 1985).

This highly fossorial frog is distributed in Illinois mainly along the central part of the Illinois River (Smith, 1951, 1961, 1966; Morris and Smith, 1981; Taubert et al., 1982; Brown and Rose, 1988; Morris, 1990; Beltz, 1991 and 1993). Other populations are, also, scattered along the Mississippi River floodplain from Madison to Alexander Counties, Illinois (Holman et al., 1964; Brown and Brown, 1973; Axtell and Haskell, 1977; Morris and Smith, 1981; Taubert et al., 1982; Gilbert, 1986; Brown and Rose, 1988; Morris, 1990; Beltz, 1991 and 1993; Tucker and Philipp, 1993 and 1995).

Several previous publications and unpublished reports provide details on the life history of *P. s. illinoensis* including information on underground feeding behavior (Brown, 1978), burrowing behavior (Axtell and Haskell, 1977; Brown et al., 1972; Tucker et al., 1995; Tucker, 1995), chorus sites (Brown and Rose, 1988), fecundity (Butterfield et al., 1989; Tucker and Phillip, 1995), post-metamorphic growth (Tucker, 1995; Tucker and Phillip, 1995), and morphological adaptations to fossorial existence (Brown and Means, 1984; Paukstis and Brown, 1987 and 1991). In a previous report (Tucker and Phillip, 1995), we presented preliminary results concerning population size, demography, food habits, activity patterns, and anthropogenic effects on breeding success. We also extended previous observations on distribution of *P. s. illinoensis* in Madison County.

The present report is a summary of results for 1995 and a continuation of studies that we initiated in 1993 and continued in 1994 (Tucker and Phillip, 1993 and 1995). Our initial objectives were:

1. Monitor the distribution of *P. s. illinoensis* choruses in appropriate habitat in the impact area.
2. Estimate the approximate number of breeding individuals visiting choruses that are located in the impact area.
3. Estimate adult survivorship rates.
4. Determine possible impact of proposed borrow activities associated with construction of FAP 310.

OBJECTIVE 1: DISTRIBUTION OF *PSEUDACRIS STRECKERI ILLINOENSIS*

METHODS: Starting 1 March 1995, we patrolled roads at night particularly on nights when rain fell or had fallen in the last 24 hours. Periodically, we stopped to listen for chorusing frogs. When *P. s. illinoensis* was heard stop, identification was considered tentative if the frog or frogs could not be caught and confirmed if frogs were captured.

The area investigated by road surveys is contained in the polygon defined by Interstate 270 to the south, Ill. route 157 to the east, Ill. route 3 to the west and Ill route 143 to the north. This area was selected because it contains all of the historical published and verbally reported (to George Rose or Michael Morris) chorus locations in the vicinity of the route of FAP 3

RESULTS: In 1995, a total of seven choruses were located (Fig. 1). At five these, we confirmed the identity of the calling frogs by catching one or more specimens of *P. s. illinoensis* (Fig. 1B, excluding Idle Acres chorus).

DISCUSSION: Choruses of *P. s. illinoensis* were found at only two locations during 1993 (Tucker and Philipp, 1993) but at seven in 1994 (Tucker and Philipp, 1995). We found frogs at the same seven chorus sites during 1995.

We were again unable to locate frogs at the Granite City site reported by Axtell and Haskell (1977) even though we searched it in 1994 (Tucker and

10.

Philipp, 1995) and in 1995 when frogs were calling elsewhere. Our 1995 survey supports the conclusion of Tucker and Philipp (1995) that the frog has been extirpated at the Granite City site.

Figure 1

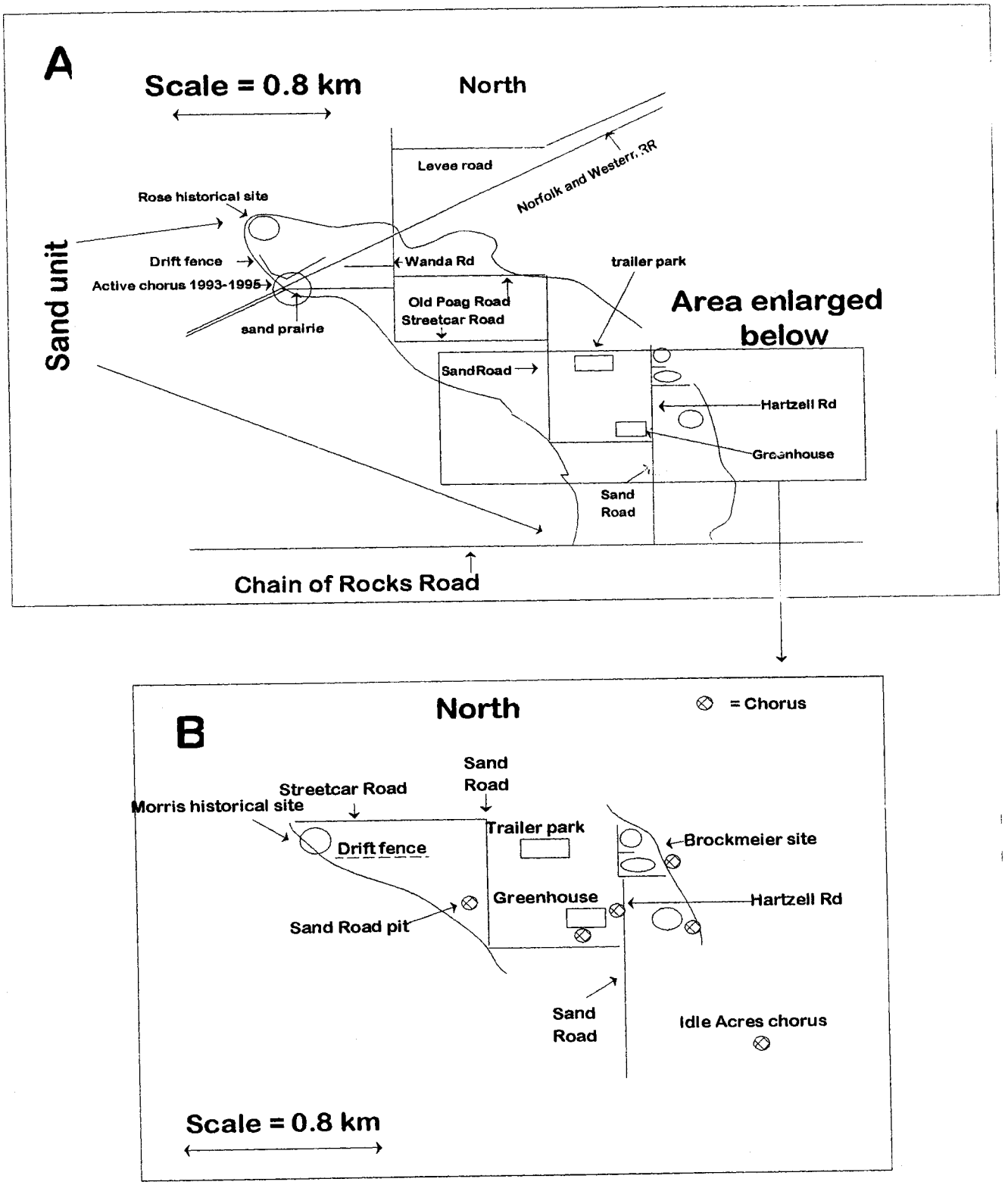
A
Scale = 0.8 km
North
Levee road
Norfolk and Western RR
Rose historical site
Sand unit
Drift fence
Active chorus 1993-1995
sand prairie
Wanda Rd
Old Poag Road
Streetcar Road
trailer park
Area enlarged below
SandRoad
Hartzell Rd
Greenhouse
Sand Road
Chain of Rocks Road
B
North
= Chorus
Sand Road
Streetcar Road
Morris historical site
Drift fence
Trailer park
Brockmeier site
Greenhouse
Hartzell Rd
Sand Road pit
Sand Road
Idle Acres chorus
Scale = 0.8 km

Figure 1. A.-The Poag sand terrace showing the relationship of the study area containing the last confirmed population of *Pseudacris streckeri illinoensis*. B.-The Sand Road study area showing locations of six of the seven chorus sites

active between 1993 and 1995.

A number of undocumented records for the South Roxana area are mentioned by Morris (1992). These are located on a different sand unit than the one where frogs are known to exist. Tucker and Philipp (1995) surveyed these locations during 1994 and found no choruses of *P. s. illinoensis* at times when frogs were calling elsewhere. In 1995, we also surveyed the sites on this terrace. No choruses of *P. s. illinoensis* were found. Thus, the Roxana choruses seem to have been extirpated supporting the conclusion reached by Tucker and Philipp (1995).

OBJECTIVES 2 AND 3: POPULATION SIZE ESTIMATE AND ADULT SURVIVORSHIP

METHODS: In a previous report (Tucker and Philipp, 1995) determined that 722 of 1170 froglets (61.7%) had been marked leaving a natal pond. Juvenile survivorship was estimated at 4.5% suggesting that 53 of these 1170 froglets would be alive in 1994. Recaptures of frogs marked in 1993 in 1995 can be used to estimate two-year survivorship. The formula used is (number of frogs recaptured in 1995/722 frogs marked in 1993)÷0.617. Two-year survivorship can then be used to estimate adult survivorship which is the number of two-ye old frogs ÷ number of one-year olds surviving from any cohort of frogs.

To estimate population size, we used the Lincoln index method. Total number of marked frogs available for recapture in 1995 was 129 marked frogs (150 1994 captures + 3 1993 captures - 23 1994 DORs).

This method has many limitations and the cautions suggested by Tucker and Philipp (1995) are repeated here. Much caution is advised in their acceptance (see McArdle et al., 1990 and Nunney and Elam, 1994, for cautions on reliance on such preliminary estimates). These frogs were in the process of a migration when marked and in the process of another when recaptured. Population estimates basically require that all frogs have an equal chance to be recaptured and this is very unlikely in this case. Our determination assumes that frogs did not leave the study area during their post-metamorphic migration or in the ensuing two years since they were marked, an assumption

not true for other frogs (i.e., Berven and Grudzien, 1990).

RESULTS: In 1995, we were only able to capture 16 adult frogs. But of this number, six were frogs that we had marked in 1993 as froglets. A preliminary estimate for the number of frogs surviving two years can be made from the 6 of 722 frogs recaptured suggesting that 1.3% of the frogs transforming from this pond survived two years. The two-year survivorship rate results in an estimate of adult survivorship of 28.3% per year. For 1995, we estimate population in 1995 as 344 frogs based on 6 recaptures from 129 marked frogs. In all, 16 frogs were caught in 1995.

DISCUSSION: The adult survivorship rate that we estimated is higher than that calculated by Berven (1990) for *Rana sylvatica* between ages one and two (i.e., 17.7%). Given these estimates of survivorship for *P. s. illinoensis*, 53 frogs would survive their first year from a cohort 1,170 frogs. After two years, 15 would remain. Of course, if significant emigration occurs then my estimates of survivorship may be low. Therefore an understanding of movements in this frog are important.

Although our estimates of population size are preliminary, we find it reassuring that the number estimated for 1994 (i.e., 420 frogs) and the number estimated in 1995 (344 frogs) are close to each other. However, even with a relatively high adult survivorship rate, the Madison County frogs must be considered at extreme risk of extinction.

OBJECTIVE 4: SURVEY OF PROPOSED BORROW ACTIVITIES

METHODS: We surveyed two proposed borrow areas (Fig. 1) for possible presence of *Pseudacris streckeri illinoensis* to gauge impact of proposed borrow activities associated with construction of FAP 310. These two sites are near or border existing choruses or near historical sites of choruses reported by previous investigators.

Site 1 was located at the northern edge of the Poag sand terrace where a chorus occurred in the past (G. Rose, pers. comm.). This site had previously

been surveyed by drift fences in 1993 and 1994 on its northern most edge. During 1995, we surveyed the southern extremity of the area. This area is immediately north of the sand prairie chorus (Fig. 1A). Site 2 was located between the existing chorus at Sand Road pit and a chorus (Fig. 1B) reported but not documented by specimens by Morris (1992).

At both sites we used silt barriers as fencing material. This is an impervious material used by construction contractors to prevent siltation streams and wetlands. At both sites, the bottom of the fence was buried using a backhoe to a depth of 25 cm. Once completed, the fences stood 95 cm tall throughout its length.

The fence at site 1 was over 900 m long. This fence paralleled the north side of the Norfolk and Western Railway and turned north at the western border of the sand unit towards the Rose historical site on the map in Fig. 1A. The fence at site 2 was 300 m long. This fence was placed between the known chorus at the Sand Road pit and a chorus reported by Morris (1992) where Streetcar Road turned north at the border of the sand unit (Fig. 1B). Each fence had variable number of pitfall traps installed along their margins to collect small animals. Fences were monitored nightly from 5 March to 15 April, a period including the calling period (March 15-April 6) of *Pseudacris s. illinoensis* in 1995.

RESULTS: Although the fence at site 1 caught many anurans including *Bufo woodhousii fowleri*, *Pseudacris triseriata*, *Rana sphenocephala*, and *R. catesbeiana*, no specimens of *P. s. illinoensis* were found. We caught the same species of anurans along with *Hyla versicolor* and *Pseudacris crucifer* at site 2. Again, no specimens of *P. s. illinoensis* were found despite the presence of a large chorus less than 500 m to the south (Fig. 1B) of the fence at site 2. We therefore concluded that borrow activities at these sites would not directly impact extant population of frogs.

DISCUSSION: Determination of the impact of proposed construction activitie

before they occur was an important practical aspect of our work. However, we also developed important confirmation of part of the information that our model of chorus extinction was based on (Tucker and Philipp, 1995). In that study, we considered the frogs absent from the northern half of the Poag sand terrace despite historical records of choruses. Even though frogs were never heard or found in the northern part of the Poag sand terrace, they could have been using it as nonbreeding habitat and then moving to the Sand Road chorus for breeding. We could have missed this movement because previous drift fences were placed on the northern edge of the Poag sand terrace.

However, results from 1995 using drift fences placed between these historical sites and known sites of choruses strongly support our conclusion that frogs have been extirpated from the northern portion of the Poag sand terrace. This is remarkable because dispersing froglets could theoretically reach these sites given the magnitude of post-metamorphic movements found by us in 1994 (Tucker and Philipp, 1995). However, potential barriers may prevent this from occurring. The Rose historical site is effectively isolated from all the other sites by Poag Road and the Norfolk and Western Railway as well as a large ditch containing fish (Tucker and Philipp, 1993). The Morris historical site is isolated from the Sand Road pit chorus by an extensive area of lawns and agriculture (Tucker and Philipp, 1995).

LITERATURE CITED

Anonymous. 1992. Rare and endangered species of Missouri Checklist. Missouri Department of Conservation, Jefferson City. 43 pp.

Axtell, R. W. and N. Haskell. 1977. An interhiatal population of *Pseudacris streckeri* from Illinois, with an assessment of its postglacial histo... Chicago Acad. Sci. Nat. Hist. Misc. 202:1-8.

Beltz, E. 1991. Illinois chorus frog, *Pseudacris streckeri illinoensis*, 1991 survey of Cass, Menard, Morgan, and Scott Counites, Illinois. Unpublished report to Illinois Dept. Conservation, Division of Natural Heritage, Springfield, Illinois. 18 pp.

Beltz, E. 1993. Distribution and status of the Illinois chorus frog, *Pseudacris streckeri illinoensis*, in Cass, Menard, Morgan, and Scott Counties of west-central Illinois. Unpublished report to Illinois Dept. Conservation, Division of Natural Heritage, Springfield, Illinois. 17 pp.

Berven, K. A. 1990. Factors affecting population fluctuations in larval and adult stages of the wood frog (*Rana sylvatica*). Ecology 71:1599-1608.

Berven, K. A., and T. A. Grudzien. 1990. Dispersal in the wood frog (*Rana sylvatica*): implications for genetic population structure. Evoluti... 44:2047-2056.

Brown, L. E. 1978. Subterranean feeding by the chorus frog *Pseudacris streckeri* (Anura: Hylidae). Herpetologica 34:212-216.

Brown, L. E. and J. R. Brown. 1973. Notes on breeding choruses of two anurans (*Scaphiopus holbrooki, Pseudacris streckeri*) in southern Illinois. Chicago Acad. Sci. Nat. Hist. Misc. 192:1-3.

Brown, L. E., H. O. Jackson, and J. R. Brown. 1972. Burrowing behavior ... the chorus frog, *Pseudacris streckeri*. Herpetologica 28:325-328.

Brown, L. E., and D. B. Means. 1984. Fossorial behavior and ecology of the chorus frog *Pseudacris ornata*. Amphibia-Reptilia 5:261-273.

Brown, L. E. and G. B. Rose. 1988. Distribution, habitat, and calling season of the Illinois chorus frog (*Pseudacris streckeri illinoensis*) along the lower Illinois River. Ill. Nat. Hist. Surv. Biol. Notes 132:1-13.

Butterfield, B. P., W. E. Meshaka, and S. E. Trauth. 1989. Fecundity an mass size of the Illinois chorus frog, *Pseudacris streckeri illinoensis* (Hylidae), from northeastern Arkansas. Southwest. Nat. 34:556-557.

Conant, R., and J. T. Collins. 1991. A Field Guide to Reptiles and Amphibians [of] Eastern and Central North America, Third edition. Houghton Mifflin Co., Boston. 450 pp.

Dodd, C. K., Jr., G. E. Drewry, R. N. Nowak, J. M. Sheppard, and J. D. Williams. 1985. Endangered and threatened wildlife and plants; revie of vertebrate wildlife; notice of review. Part III. U. S. Dept. Interior, Fish and Wildlife Serv. Federal Register 50:37958-37967.

Gilbert, H. R. 1986. Geographic distribution: *Pseudacris streckeri* d erg *illinoensis* (Illinois chorus frog). Herpetol. Rev. 17:65.

Herkert, J. R. 1992. Endangered and threatened species of Illinois: Status and distribution. Volume 2 - Animals. Illinois Endangered Species Protection Board, Springfield. 142 pp.

Holman, J. A., H. O. Jackson, and H. W. Hill. 1964. *Pseudacris streckeri illinoensis* from extreme southern Illinois. Herpetologica 20:205.

McArdle, B. H., K. L. Gaston, and J. H. Lawton. 1990. Variation in the size of animal populations: patterns, problems and artefacts. J. Anim. Ecol. 59:439-454.

Morris, M. A. 1990. Ranges of amphibians and reptiles, pp. 52-77 *in* R. A. Brandon. Herpetology laboratory notebook. Kopies and More: Carbondale, Il.

Morris, M. A. 1992. Status of 1991 Illinois chorus frog (*Pseudacris illinoensis*) populations in Madison County, Illinois. Unpublished report submitted to Illinois Dept. of Transportation. 10 pp.

Morris, M. A. and P. W. Smith. 1981. Endangered and threatened amphibians and reptiles, pp. 21-33 *in* M. L. Bowles, V. E. Diersing, J. E. Ebinger, and H. C. Schultz, eds. Endangered and threatened vertebrate animal and vascular plants of Illinois. Illinois Dept. of Conservation: Springfield.

Nunney, L., and D. R. Elam. 1994. Estimating the effective population size of conserved populations. Conserv. Biol. 8:175-184.

Paukstis, G. L., and L. E. Brown. 1987. Evolution of the intercalary cartilage in chorus frogs, genus *Pseudacris* (Salientia: Hylidae). Brimleyana 13:55-61.

Paukstis, G. L., and L. E. Brown. 1991. Evolutionary trends in the morphology of the intercalary phalanx of anuran amphibians. Can. J. Zool. 69:1297-1301.

Smith, P. W. 1951. A new frog and a new turtle from the western Illinois sand prairies. Bull. Chicago Acad. Sci. 9:189-199.

Smith, P. W. 1961. The amphibians and reptiles of Illinois. Ill. Nat. Hist. Surv. Bull. 28:1-298.

Smith, P. W. 1966. *Pseudacris streckeri*. Cat. Am. Amphibians Reptiles 27.. 27.2.

Taubert, D. B., P. W. Shetley, D. P. Philipp, and T. Harrison. 1982. Breeding biology and distribution of the Illinois chorus frog (*Pseudacris streckeri illinoensis*) in Illinois. Illinois Dept. of Conservation: Springfield. 163 pp.

Tucker, J. K. 1995. Early post-transformational growth in the Illinois chorus frog (*Pseudacris streckeri illinoensis*). J. Herpetol. 29:314 316.

Tucker, J. K., J. B. Camerer, and J. B. Hatcher. 1995. Natural history note: *Pseudacris streckeri illinoensis* (Illinois Chorus Frog) Burrows. Herpetol. Rev. 26:32-33.

Tucker, J. K., and D. P. Philipp. 1993. Population status of the Illinois chorus frog (*Pseudacris streckeri illinoensis*) in Madison County, Illinois with emphasis on the New Poag Road/FAP 413 interchange and FAP 413 wetland mitigation site. Illinois Nat. Hist. Surv. Aquatic Ecol. Tech. Rept. 93/17. 32 pp.

Tucker, J. K., and D. P. Philipp. 1995. Population status of the Illinois chorus frog (*Pseudacris streckeri illinoensis*) in Madison County, Illinois: Results of 1994 surveys. Illinois Nat. Hist. Surv. Aquatic Ecol. Tech. Rept.